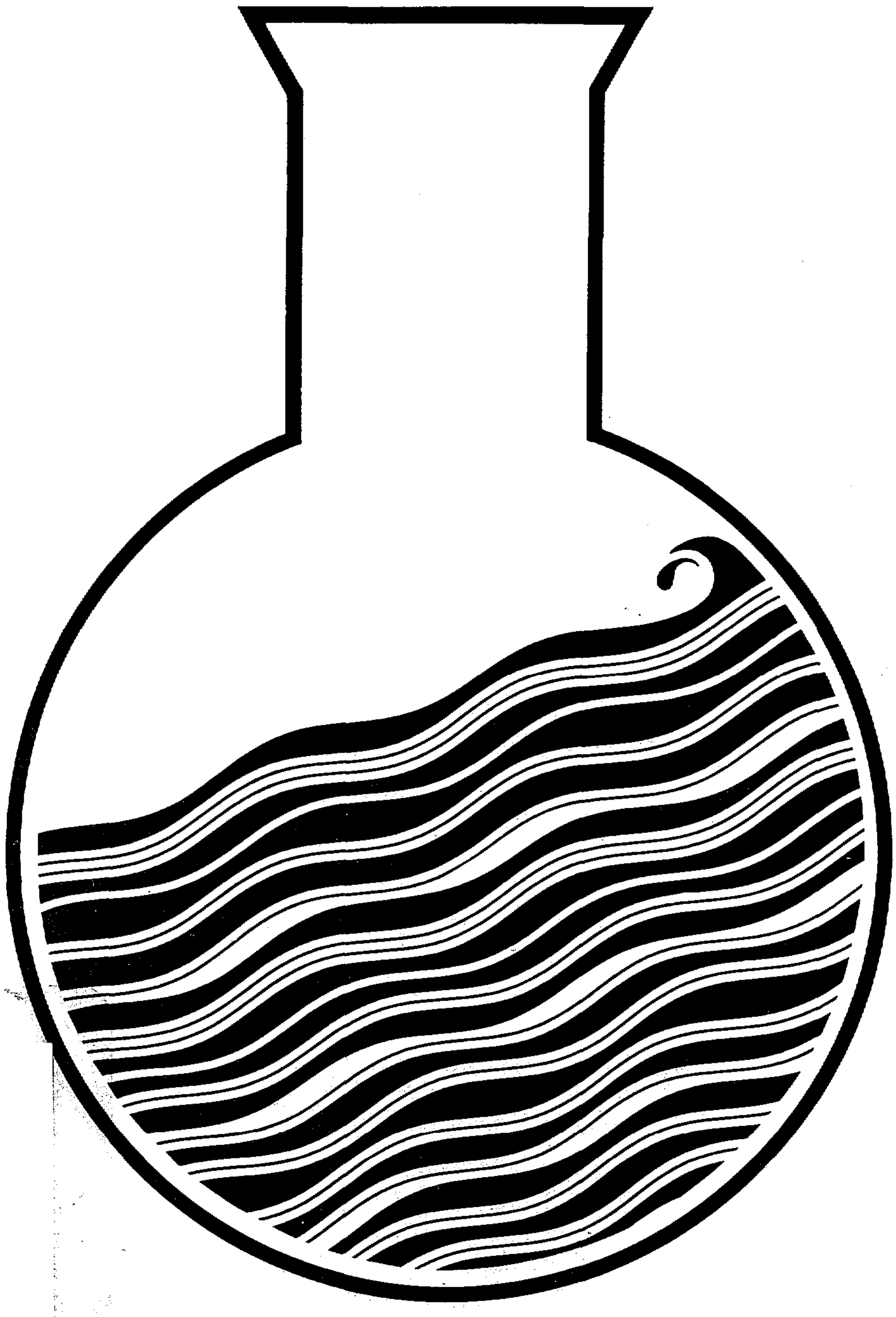
Towards a National Marine Pollution Policy



Rhode Island. Center for Ocean Mgmt Studies

University of Rhode Island Center for Ocean Management Studies

Towards a National Marine Pollution Policy

Proceedings from a Workshop
on Marine Pollution Policy
held June 25-27, 1980

Center for Ocean Management Studies
University of Rhode Island
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This document was developed from the National Marine Pollution Policy Workshop, which was held June 25-27, 1980, at Galilee, Rhode Island. The workshop was sponsored by the Center for Ocean Management Studies of the University of Rhode Island in cooperation with the National Marine Pollution Program Office of the National Oceanic and Atmospheric Administration of the United States Department of Commerce. Funding was provided by the National Marine Pollution Program Office.

The Center for Ocean Management Studies was created in the fall of 1976 for the purpose of promoting effective coastal and ocean management. The Center identifies ocean management issues, holds workshops and conferences to discuss these issues, and develops recommendations and research programs to resolve them.

TABLE OF CONTENTS

PREFACE

The National Ocean Pollution Research and Development and Monitoring Planning Act of 1978 established a comprehensive planning process for the development of "the necessary base of information to support, and to provide for, the national, efficient and equitable utilization, conservation, and development of ocean and coastal resources." In accordance with the mandate of the law, an interagency committee developed the first Federal Plan for Ocean Pollution Research Development and Monitoring. The first plan generally described the present national effort and outlined present research priorities. To help develop a more comprehensive framework for the second federal plan, the Center for Ocean Management Studies, University of Rhode Island, in cooperation with the National Marine Pollution Program Office, sponsored a Marine Pollution Policy Workshop June 23-25, 1980, at the Dutch Inn in Galilee, Rhode Island.

The general purpose of the workshop was (1) to review and evaluate the effectiveness of approaches we take in defining important marine pollution problems and in organizing research and monitoring activities in response to those problems, and (2) to recommend new strategies and approaches, where needed, in order to improve the usefulness and timeliness of information and to better address marine pollution problems in the 1980s. Workshop discussions were focused around three topic areas: Marine Waste Disposal; Outer Continental Shelf (OCS) Oil and Gas Development; and Hazardous Material Spill Damage Assessment. State of the art papers were presented on each topic area. Separate panels addressed each area. The discussion papers and panel reports are included in this proceedings.

The theme for the workshop was Assimilative Capacity, defined as "the amount of material that could be contained within a body of sea-water without producing an unacceptable biological impact." Workshop participants were asked to accept this definition and to further accept that at least the following four factors go into making determinations of assimilative capacity:

1. Representative biological indicators (including health, recreation, aesthetics) must be selected.

2. Pollutants for which assimilative capacity is to be determined must be identified.

3. Sources of selected pollutants must be identified and characterized; pathways, transformations, and sinks must be characterized; and effects of pollutants on biological indicators must be defined.

4. A threshold of what constitutes an "unacceptable impact" must be set.

These four factors involve both scientific and social-value considerations. The scientific information is usually needed to make good value decisions while some assessment of important values is needed to guide research.

Workshop participants were asked to discuss the application of the assimilative capacity concept to the three topic areas. It was assumed that all waste disposal, OCS, and damage assessment decisions involve some consideration of the concept, although it is not always recognized.

Marine Waste Disposal. The classical application of the assimilative capacity concept has been in this area, and the Crystal

Mountain proceedings, Assimilative Capacity of U.S. Coastal Waters, represent state of the art thinking. While essentially all decisions to dispose or not to dispose of wastes in the marine environment involve assimilative capacity considerations, there is no evidence that the four factors presented above are rigorously considered in designing waste disposal research programs.

OCS Oil and Gas Leasing. The acceptance of risk from platform blowouts and leaks, the siting of platforms and pipelines, and the issuance of platform discharge permits are all assimilative capacity decisions to some extent. Although the concept is not usually actively applied to this area, it may provide a different and more useful slant for assessing potential OCS development impacts. In addition, research priorities may be clarified. The major portion of the federal budget in marine pollution research, development, and monitoring is OCS environmental research, and the OCS will become increasingly important in the 1980s to meet energy demands.

Hazardous Material Spill Damage Assessment. The concept of assimilative capacity underpins the development and application of environmental damage assessment procedures. Pending legislation calls for developing an intensive federal capability in this area. The interplay of scientific and social-value considerations (the four factors) is complex, and more detailed guidance is needed to identify the important up-front research and to organize a responsive damage assessment program.

This proceedings summarizes the workshop discussions. We hope that it will prove useful in developing strategies to better define specific needs and priorities for marine pollution research development and monitoring efforts.

Acknowledgments

Many people contributed ideas to this effort. The workshop planning committee defined the goals and objectives of the workshop, identified potential participants, and developed charges for the workshop panels.

Planning Committee

Chairman: John Knauss
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Panel moderators guided the panel discussions and developed the panel reports:

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Lastly, the workshop participants, who are recognized experts in their fields, contributed valuable time and effort to the discussions. They are listed at the end of each panel report.

The staff of the Center for Ocean Management Studies also deserve a special acknowledgment. Nicole Cornillon, Lynne Hansen, and Susan Harvey served as rapporteurs for the panels. Carol Dryfoos, Lynn Howell, Judy Adams, and Nancy Ingham provided logistical and technical support in organizing the workshop and preparing the proceedings.

Funding for the workshop was provided by the National Marine Pollution Program Office, National Oceanic and Atmospheric Administration.

Virginia K. Tippie
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ASSIMILATIVE CAPACITY:

A FRAMEWORK FOR ENVIRONMENTAL DECISION-MAKING

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ASSIMILATIVE CAPACITY: A FRAMEWORK FOR ENVIRONMENTAL DECISION-MAKING

The National Marine Pollution Program Office is responsible to the National Oceanic and Atmospheric Administration (NOAA) and a committee of federal agencies for preparing a five-year Federal Plan on Ocean Pollution Research, Development, and Monitoring every two years. The first federal plan was published in the fall of 1979, and the second plan is due in 1981.

Much of the effort in preparing the first plan was spent in simply identifying for the first time all that was going on in the federal government in marine pollution research. Nearly 1,000 projects were funded by some 11 federal agencies at a cost of $165 million in FY 1978. In the first plan we looked at the ongoing federal effort from several perspectives to grasp the overall emphasis of the program and, based on that review, made a number of general recommendations on how to improve the federal effort.

The federal ocean pollution planning process is somewhat unique in that it is supposed to cut across agency missions and mandates, not to replace those missions and mandates but to integrate information requirements in a framework that is more representative of the workings of the environment. Our objective is to translate between information requirements of decision-makers and ocean research and development.

In standing back and looking at the entire federal program, it is hard to find conceptual threads with which to weave together all that the government is doing--there is no organizing framework to help interrelate programs. The problems in the environment, however, are very interrelated. That is the purpose of this workshop--to help evaluate the perspectives with which we organize ocean pollution research programs.

Trying to come up with organizing themes or unifying threads is particularly important at this time:

1. We are entering a period of fiscal austerity that will be with us for a while. Pressure will increase to justify priorities, to demonstrate close cooperation, and to show no overlap of programs.
2. The use of marine and coastal areas will increase substantially in the 1980s, particularly for energy development. Development decisions will become more frequent, and time to make the decisions will shorten. The Energy Mobilization Board is a prime example. The turnaround time for R and D to assess consequences will become less and less.
3. Finally, I have an intuitive sense that our current approach is inefficient. There is limited accountability between scientific problem definition and the information needs of decision-makers. Priorities are set in very limited contexts out of expediency, and important needs, such as long-term and multiple impact studies, suffer.

In presenting the annual Doherty Lecture in Ocean Policy last month, the NOAA administrator characterized the 1970s as the decade in which most of our ocean laws were written and overall policies were set. Examples are Coastal Zone Management Act; Marine Protection, Research, and Sanctuaries Act; Clean Water Act; and the Outer Continental Lands Act Amendments. He went on to emphasize that the 1980s will be the "era of implementation" or turning the policies into programs - a more difficult and less glamorous task than putting the policies in place.

Ocean pollution R and D faces a major challenge in the 1980s to be responsive to decision-makers as ocean policies are implemented. Just as important will be the information needs of other major national policies and programs, such as implementation of the Toxic Substances Control Act and the Energy Mobilization Board. Specific pressures will come in the following areas:

1. Energy development and production. This includes Outer Continental Shelf (OCS) development and coastal siting of facilities, for example, power plants and refineries.
2. Waste disposal. Local opposition to land-based sites for radioactive materials and toxic substances will be substantial, and the oceans will look very attractive.
3. Coastal development and wetland preservation. Population pressures and upstream development will tax coastal areas.

The overall goal of this workshop is to evaluate the way we, as a nation, deal with marine pollution problems--specifically, the way we develop and organize information on actual or potential pollution problems to make the best possible decisions. Three important areas have been identified that will pose major policy actions in the coming decade:

1. Marine waste disposal, including municipal and industrial outfalls, sludge and industrial waste dumping, dredged material disposal, and radioactive wastes;
2. OCS oil and gas development; and
3. Hazardous material spill damage assessment

These topics will provide focus for our discussions. The first step will be to evaluate how we have dealt with marine pollution problems in each of the three areas up to now. How have we defined pollution problems, and how have we organized our intellectual and technical resources to assess problem scope and magnitude? Presentations will be made to set this historical perspective and summarize the state of the art in each area.

To stimulate debate, I am proposing the concept of Assimilative Capacity as an effective framework for environmental decision-making. I had the good fortune to participate last year in the Crystal Mountain Workshop on the assimilative capacity of U.S. coastal waters organized by Edward Goldberg and Wilmot Hess. Having devoted considerable effort at that time trying to make sense out of the entire federal program in ocean pollution research, I found the concept extremely useful, particularly in identifying information needs for major problem areas.

Let me develop this theme a bit more. Marine assimilative capacity is defined in the recent Crystal Mountain proceedings as "the amount of material that could be contained within a body of seawater without producing an unacceptable biological impact." Using this definition, at least four key factors can be identified that go into making determinations of assimilative capacity:

1. Critical pollutants (including transformation by-products) for which assimilative capacity is to be determined must be identified.
2. Representative indicators must be selected (target organisms, populations, communities, ecosystems; human health; recreational and aesthetic values).
3. We must identify and characterize sources, pathways, and sinks for selected pollutants and by-products. Also short- and long-term effects on selected indicators must be defined.

4. Finally, a threshold or thresholds of what constitutes an "unacceptable impact" must be set.

A key observation is that these factors involve both scientific and social-value considerations. The interplay among these factors is complex. An understanding of critical pathways and pollutant effects is essential in order to identify appropriate indicators. At the same time, an appreciation of relative social values is useful to help focus research priorities.

I contend that in the broadest context of the definition, most, if not all, of the decisions we make relative to marine pollution are assimilative capacity decisions. For the sake of our discussions here, I include decisions to accept or not accept the probability of pollution spills or leaks <u>and</u> decisions calling for no discharge (which would cover such persistent substances as nondegradable synthetic organics and high-level radioactive wastes--the decision here, of course, is that assimilative capacity approaches zero). Whether we like it or not, all of our decisions related to ocean pollution are assimilative capacity decisions although this is not often recognized. If this is true, would an explicit policy of assimilative capacity applied to marine pollution problems help us better define the problems and the information needed to make good decisions to alleviate them? I invite you to use this thesis as a starting point for your panel discussions and tear it apart if you wish. If you find it wanting, I urge you to put something in its place.

Let us examine the three panel subject areas in the light of assimilative capacity:

1. <u>Marine Waste Disposal</u>. The classical application of the assimilative capacity concept has been in this area, and the Crystal Mountain proceedings represent state of the art

thinking. While essentially all decisions to dispose or not to dispose of wastes in the marine environment involve assimilative capacity considerations, there is no evidence that the four factors presented above are rigorously considered in designing waste disposal research programs. In trying to develop site-specific capacities for selected pollutants at the Crystal Mountain Workshop, it became clear that key information was lacking or had conflicting interpretations. Many heroic assumptions had to be made in areas such as the New York Bight, which has been studied intensely for a number of years. I cannot help questioning whether, if we had gone through an exercise such as Crystal Mountain ten years ago, we would have organized our research differently.

The 301(h) exercise represents one area where assimilative capacity is the organizing concept.

2. Hazardous Material Spill Damage Assessment. The concept of assimilative capacity underpins the development and application of environmental damage assessment procedures. Pending legislation calls for developing an intensive federal capability in this area. The interplay of scientific and social value considerations (the four factors) is complex, and more detailed guidance is needed to identify the important up-front research and to organize a responsive damage assessment program.

3. OCS Oil and Gas Leasing. The acceptance of risk from platform blowouts and leaks, the siting of platforms and pipelines, and the issuance of platform discharge permits are all assimilative capacity decisions to some extent. Although the concept is not usually actively applied to this area, it may provide a

different and more useful slant for assessing potential OCS development impacts. In addition, research priorities may be clarified. The OCS environmental research constitutes the major portion of the federal budget in marine pollution research, development, and monitoring, and the OCS will become increasingly important in the 1980s to meet energy demands.

Let me conclude by identifying some of the possible pros and cons of adopting a conscious policy of assimilative capacity:

Pro

1. By accepting the concept of marine assimilative capacity, it is difficult to avoid the larger concept of a global assimilative capacity, including air, land, and water. This larger context is essential to allow a weighing of all social costs and benefits.
2. In considering a particular polluting problem, all sources of the pollutant must be considered along with all pathways, sinks, and biological receptors. This could lead to a more holistic approach for organizing and integrating research efforts.
3. The relative priority of information needs among different pollutant sources, critical pathways, and environmental receptors is highlighted.
4. The confusion between what are scientific issues and what are social issues is easier to resolve.
5. The importance of a well-designed monitoring system to track pollutant pathways, uptakes, and loadings may be easier to demonstrate. Monitoring requirements for 301(h) are a good example.

6. And finally, it may be easier to demonstrate the importance of long-term effects assessment programs which unfortunately tend to come out at the bottom of the heap because impacts are, by definition, distant and obscure.

Con

1. Do we create an impression that ocean waste disposal is perfectly acceptable - an attitude where the caveats and scientific cautions get lost. Our knowledge of environmental system processes in most cases is very limited. Without adequate checks and balances, such as a good follow-up monitoring to keep tabs on pollutant pathways and loadings, bad capacity decisions may be perpetuated with disastrous environmental consequences.

This workshop is to be a brainstorming session. We have developed overall guidance for the workshop and for the panels to help structure the discussions and the results of your deliberations. Do not feel constrained by this structure. My thoughts on assimilative capacity are a stalking-horse to stimulate debate and to surface alternative concepts. I expect the panels and the workshop as a whole to develop recommendations that will help the nation to better deal with pollution problems in the coming decade. I plan to use your insights as we prepare the next federal pollution plan.

LEGISLATIVE HISTORY AND PHILOSOPHY OF THE DEVELOPMENT

OF THE U.S. NATIONAL MARINE POLLUTION STRATEGY

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LEGISLATIVE HISTORY AND PHILOSOPHY OF THE DEVELOPMENT OF THE U.S. NATIONAL MARINE POLLUTION STRATEGY

Introduction

The history of concerns about pollution and waste disposal in the marine environment is embedded in the evolution of federal regulations controlling these activities. While there have been many legislative acts to control marine pollution, six of these are illustrative of the approach taken to control ocean pollution from waste discharges: (1) the Refuse Act of 1886, (2) the expanded Refuse Act (Rivers and Harbors Act of 1899), (3) the Federal Water Pollution Control Act of 1948, (4) the Federal Water Pollution Control Act Amendments of 1972, (5) Marine Protection, Research, and Sanctuaries Act of 1972, and (6) the Clean Water Act Amendments of 1977.

Prior to the 1920s, local, state, and public health agencies were concerned primarily with the protection of potable water supplies. The only federal water pollution control legislation prior to 1920 was the Refuse Act and its subsequent amendments, enacted by Congress to prohibit the dumping of refuse into New York Harbor and other navigable waters of the United States. The concern addressed by the Refuse Act was the prevention of impediments to navigation, but in later years the regulations were applied on behalf of the protection of water quality in navigable waters.

Rivers and Harbors Act of 1899

Federal regulation of the dumping of materials into navigable waters first came into being in the United States with the passage of the Rivers and Harbors Act of 1899. Section 10 of the Act (30 Stat. 1151j 33 USC 403) states:

> That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin...or other structures in any port...harbor, canal, navigable river, or other water of the United States...except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any matter to alter or modify the course, location, condition, or capacity of, any port...harbor, canal...or the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same.

For approximately 60 years, the U.S. emphasis focused on the dumping of an "obstruction."

Beginning in the 1920s and continuing until the late 1940s, the federal government developed increasing interest in the problems related to water pollution, including the Oil Pollution Act of 1924, enacted to prevent ships from discharging oil into navigable waters and causing beach pollution and damage to shellfish beds and creating fire hazards in and around the harbors.

After many attempts at developing further ocean pollution-related legislation, the Federal Water Pollution Control Act (FWPCA) of 1948 became law. It was enacted during a period when local and state agencies were very active in developing pollution control regulations and, as a result, the FWPCA of 1948 declared the federal role to be one of supporting ongoing state and local activities. This support role, provided only at the request of local or state agencies, took the form of research, dissemination of information, and grants or loans for sewage treatment plants. The only identifiable enforcement authority held by the federal government under this Act related to the Surgeon General, who could act (upon local request) to abate interstate conditions of pollution which endangered health and welfare. The most significant impact of the FWPCA, although not immediately obvious, was that it initiated a trend toward the relocation of authority for water pollution control from state and local agencies to the federal government. Subsequent legislation promulgated between 1948 and the 1972 amendments to the Federal Water Pollution Control Act completed this shift, with the federal government assuming full responsibility for protection of our coastal waters from pollution.

The close of 1970 saw, through the Ash Council's Reorganization Plan #3, the creation of the Environmental Protection Agency (EPA) from the Department of the Interior. Almost immediately, a debate started between the EPA and the Corps of Engineers over which agency would control Refuse Act permits. On December 23, 1970, President Richard Nixon, through Executive Order 11574, granted authority to the Secretary of the Army through the Refuse Act permit program, to grant, after consultation with the administrator of EPA, all permits pertaining to such Act. This same executive order also described guidelines that were to be followed in evaluating permit applications. The Council of Environmental Quality (CEQ) was to coordinate "all regulations, policies, and procedures of federal agencies with respect to the Refuse Act permit program."

The development of a national permit system then began in earnest, but it was hampered by several major obstacles. Initially, industries were reluctant to apply for effluent permits through this system, however, threat of suits by the EPA resulted in approximately 10,000 applications from the estimated 40,000 major industries involved. The next major obstacle involved an Ohio federal district court decision, known as the

Kalur decision, which required that any permits issued under the 1899 Act be subject to the policies of the National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190). Section 102 of NEPA states that "...all agencies of the federal government shall...include in every major federal action significantly affecting the quality of the human environment, a detailed statement by the responsible official (1) the environmental impact of the proposed action, (2) any adverse environmental effects which cannot be avoided should the proposal be implemented and (3) alternatives to the proposed action..." Thus, with NEPA, Environmental Impact Statements (EISs) were created. The Kalur decision meant that an appropriate EIS had to be formulated for each permit issued. Lacking the personnel and facilities for this monumental task, the Corps of Engineers and EPA were forced to abandon their permit efforts until the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA) were created.

Federal Water Pollution Control Act Amendments of 1972

On October 18, 1972, the U.S. Congress (1972a) enacted Public Law P.L. 92-500 entitled "Federal Water Pollution Control Act Amendments of 1972." It is commonly called the "Clean Water Act." The objective of this act was to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The statute, administered by EPA, set into effect a massive effort to clean up the nation's waters. Some of the important provisions of the law are major financial assistance for construction of municipal waste treatment facilities, grants to encourage regional waste treatment projects, streamlined enforcement procedures, a strengthened capability to deal with spills of oil and hazardous materials, and a permit program calling for stringent control of all effluent discharges. Regarding control of marine pollution, the Act provides for a water quality surveillance system for monitoring the quality of navigable waters including the contiguous zone (Sec. 104[a] [5]), coordinated research efforts on pollution problems of the estuarine zone (Sec. 104n), identification of the location of in-place pollutants with emphasis on toxic pollutants in harbors and navigable waterways. The EPA administration is authorized, acting through the Secretary of the Army, to make contracts for the removal and appropriate disposal of such materials from critical port and harbor areas (Sec. 115). Also the EPA is to make an annual water quality assessment and an inventory of all point sources of discharge of pollutants into all navigable waters, including those of the contiguous zone (Sec. 305); limit discharges into the navigable waters and create a national contingency plan for the removal of oil and other hazardous substances (Sec. 311); and promulgate of ocean disposal criteria and issuance of a permit for lawful ocean disposal when in compliance with such guidelines (Sec. 402, 403). Critical aspects of Section 403 are:

"(a) No permit under Section 402 of this Act for a discharge into the territorial sea, the waters of the contiguous zone, or the oceans shall be issued, after promulgation of guidelines established under (c) of this Section, except in compliance with such guidelines. Prior to the promulgation of such guidelines, a permit may be issued under Section 402 if the Administrator determines it to be in the public interest.

"(b) The requirements of subsection (d) of Section 402 of this Act may not be waived in the case of permits for discharges into the territorial sea.

"(c) (1) The Administrator shall, within one hundred and eight days after enactment of this Act (and from time to time thereafter), promulgate guidelines for determining the degradation of the waters of the territorial seas, the contiguous zone, and the oceans, which shall include:

"(A) the effect of disposal of pollutants on human health or welfare, including but not limited to plankton, fish, shellfish, wildlife, shorelines, and beaches;

"(B) the effect of disposal of pollutants on marine life including the transfer, concentration, and dispersal of pollutants or their byproducts through biological, physical, and chemical processes; changes in marine ecosystem diversity, productivity, and stability; and species and community population changes;

"(C) the effect of disposal, of pollutants on esthetic, recreation, and economic values;

"(D) the persistence and permanence of the effects of disposal of pollutants;

"(E) the effect of the disposal at varying rates, of particular volumes and concentrations of pollutants;

"(F) other possible locations and methods of disposal or recycling of pollutants including land-based alternatives; and

"(G) the effect on alternate uses of the oceans, such as mineral exploitation and scientific study.

"(2) In any event where insufficient information exists on any proposed discharge to make a reasonable judgment on any of the guidelines established pursuant to this subsection no permit shall be issued under Section 402 of this Act."

Creation of the National Permit Discharge Elimination System (NPDES)

The Federal Water Pollution Control Act Amendments of 1972 defined an entirely new permit system and delegated total authority for permit granting to the EPA, all but eliminated the participation of the Corps of Engineers except in the area of dredge and fill activities as defined under Section 404 of the new bill. It is a system of controls regulating pollutant discharges into the navigable waters of the United States. Any citizen, company or industry wishing to discharge any pollutant into the nation's waters must first obtain a NPDES permit. The U.S. Environmental Protection Agency has direct authority over the permit system, although this authority can be delegated to any state whose permit system meets EPA standards and approval.

The roots of the NPDES permits go back into the 1800s, when Congress passed the Refuse Act of 1899. The Secretary of the Army, with the agreement of the Corps of Engineers could issue a permit for the deposition into navigable waters of any material covered by the Act. This was the real beginning of a permit system. Until 1962, the Refuse Act of 1899 was interpreted to apply only to refuse that would interfere with navigation. In 1962 the Supreme Court ruled that deposition of liquid materials could be regulated by this Act. This decision was a great step toward the development of pollution control permits, although its significance was not realized until several years later, when in March 1970, Walter Hickel, then Secretary of the Interior, brought suit against the Florida Power and Light Company, pursuant to this redefined Refuse Act. During this period, several revisions had come into existence, but no provisions were included for pollutant discharge limitations--an obvious oversight by Congress. Not until the controversy arose over the Hickel suit was serious thought given to creating a new permit system. To rectify the oversight the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) was enacted. The transition from act to regulation is not an easy project. An act is not a regulation--it only gives authority for the stipulated agency to draft regulations according to the guidelines set forth in the Act. It was many months before the EPA was able to formulate these regulations. They are defined under the Code of Federal Regulations, Chapter 40 (Protection and Environment). Parts 124 and 125 describe the NPDES program. In keeping with the general philosophy that states have "primary responsibilities and rights" to take a major role in preventing and eliminating water pollution, as expressed by Congress in the FWPCAA of 1972, the law requires the EPA to delegate permit granting authority to the state if the state so wishes and if the state permit system can meet the EPA requirements and approvals. This process is described in the December 22, 1972, Federal Register.

Pollutants covered by the NPDES program include the point source discharges of "solid wastes, sewage, garbage, munitions, chemical wastes, biological materials, radioactive materials, heat, rock, sand, cellar dirt, and industrial, municipal, and agricultural wastes discharged into water." The permit system does not regulate discharges from vessels in coastal or ocean waters, aquaculture projects, dredged or fill material, or material injected into oil or gas wells. All of these discharges are regulated by other federal regulations. The Army Corps of Engineers retains authority over all dredge and fill activities pursuant to Section 404 of the Act.

Marine Protection, Research, and Sanctuaries Act of 1972

The primary legislation for ocean dumping was the enactment by Congress of P.L. 92-532, entitled "Marine Protection, Research, and Sanctuaries Act of 1972." It is commonly called the "Ocean Dumping Act." The Congress declared that it is the policy of the United States to regulate the dumping of all types of material into ocean waters which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities.

To implement the U.S. policy, the Act regulates the transportation of material from the United States for dumping into ocean waters. It also regulates dumping of material, transported from outside the United States, in ocean waters over which the United States has jurisdiction or over which it may exercise control.

The Act prohibits the dumping of high-level radioactive wastes and all biological, chemical, and radiological warfare agents into the ocean. The dumping of other wastes, except dredge spoils regulated by the U.S. Army Corps of Engineers, is to be strictly regulated by the U.S. Environmental Protection Agency.

Title II of the Ocean Dumping Act is called "Comprehensive Research on Ocean Dumping." It reads as follows:

Sec. 201. The Secretary of Commerce, in coordination with the Secretary of the Department in which the Coast Guard is operating and with the (EPA) Administrator, shall, within six months of the enactment of this Act, initiate a comprehensive and continuing program of monitoring and research regarding the effects of the dumping of material into ocean waters or other coastal waters where the tide ebbs and flows or into the Great Lakes or their connecting waters and shall report from time to time, not less frequently than annually, his findings (including an evaluation of the short-term ecological effects and the social and economic factors involved) to the Congress.

Sec. 202. (a) The Secretary of Commerce, in consultation with other appropriate federal departments, agencies, and instrumentalities shall, within six months of the enactment of this Act, initiate a comprehensive and continuing program of research with respect to the possible long-range effects of pollution, overfishing, and man-induced changes of ocean ecosystems. In carrying out such research, the Secretary of Commerce shall take into account such factors as existing and proposed international policies affecting oceanic problems and economic considerations involved in which the health of the oceans may best be preserved for the benefit of succeeding generations of mankind.

To implement the Section 201 mandate, the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce established the Ocean Dumping Program on October 1, 1976.

On January 11, 1977, the U.S. Environmental Protection Agency issued "Ocean Dumping: Final Revision of Regulations and Criteria." The EPA rules and regulations describe in detail, considering the state of the art of the oceanographic and technological knowledge, the operational procedures to be followed when an ocean dumping permit is sought.

Of special scientific interest is the specific criteria for dumpsite selection. The factors considered include the following:

1. Geographic location
2. Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile
3. Location in relation to amenity areas such as swimming beaches
4. Types, quantities, packing, method of release of wastes

5. Feasibility of surveillance and monitoring
6. Diffusion, dispersion, mixing
7. Previous dumping effects including cumulative effects
8. Interference with shipping, fishing, recreation, mineral extraction, desalination, aquaculture, areas of specific scientific importance, and other legitimate uses of the ocean
9. Water quality and ecology of the site
10. Potential for the development or recruitment of nuisance species at the site
11. Cultural or historical site

Before we proceed to discuss the Clean Water Act Amendments of 1977, we would like to emphasize the changes that have occurred in water pollution control authority as they relate to the subject of our discussion.

The most significant change in water pollution control since the 1920s has been the centralization of the water pollution control authority within the federal government. As a result, the regulations promulgated have established national standards to be used in protecting the waters of the United States. The results of this approach are entirely different from the results of leaving the pollution control authority in the hands of the state. State control authority implies far less uniformity of treatment resulting from general adoption of area-by-area, or variable, approaches to water pollution control.

Clean Water Act Amendments of 1977

On December 16, 1977, a new water pollution control act, the Clean Water Act of 1977 (P.L. 95-217), was passed by Congress which contains several slight changes with respect to NPDES permits. Permits issued under Section 402 will now have to be certified by the state to comply with state water quality standards as adopted under Section 303. Another change is that the administrator of the EPA now has the authority to disapprove a permit for a publicly-owned treatment plant even when the state has permit-writing authority. Section 404, under which the Army Corps of Engineers regulates dredge and fill, has been amended to require that the Corps delegate 404 permit-writing authority to the state if the state 404 permit program can meet Corps approval.

In order to have its permit program approved, a state must do the following:

1. Have an enforceable statute which prohibits discharges of pollutants except with an NPDES permit

2. Make sure the discharges comply with the specified procedures when filing for an NPDES permit

3. Transmit and accept from the EPA any information relevant to the permit application

4. Make sure applications are signed by the appropriate personnel, such as the principal executive officer of a corporation

5. Allow for a public notice and comment period and notify other governmental agencies and request comments

6. Prepare fact sheets for all dischargers whose discharge is greater than 50,000 gallons on any day of the year

This Act resulted in a modification of the approach to water pollution control directed by the FWPCA of 1972. The provisions of the Act modify the provisions of the FWPCA of 1972 by (1) reflecting a more pronounced concern with toxic pollutants, (2) demonstrating greater interest in alternative waste treatment strategies, and (3) suggesting reexamination of the stringent effluents limitations. These modifications are primarily reflected in Section 301(h) of the Clean Water Act.

The Clean Water Act has several elements that indicate a possible change in philosophy regarding waste disposal into marine waters. This is most noticeable in Sections 301(h) and 403(c). This change in philosophy relates to the realization that ocean disposal of wastes can be accomplished in a manner that accounts for the local and regional variability of the coastal waters to accommodate wastes. Sections 301(h) and 403(c) require that permits to dispose of waste materials into the coastal waters, territorial seas, the contiguous zone and the oceans will be granted only if it can be demonstrated that the material will not cause a degradation of the associated coastal ecosystem. In addition, under Section 301(h) a discharger must implement a toxics control program and an environmental monitoring program to maintain vigilance on the effects of continued discharge of municipal wastes with less than secondary treatment.

The Section 403(c) of the Clean Water Act requires the establishment of "Ocean Discharge Criteria." Specifically, this section requires the establishment of "guidelines for determining the degradation of the waters of the territorial seas, the contiguous zone, and the oceans." These guidelines must address the <u>effects of pollutants</u> on public health, marine biota, and shorelines; the <u>persistence and permanence</u> of these effects; waste disposal techniques and <u>alternative locations and methods</u>; and ocean-use conflicts.

If one considers the impact of the Section 301(h) and 403(c), it becomes obvious that the Congress is requiring consideration of the assimilative capacity of the coastal waters before dischargers place wastes into these waters. The primary concern being highlighted is the establishment of acceptable levels of impact/effects of wastes as opposed to the achievement of specific national effluent standards. The driving force for this change appears to be related to the economic impact on local, state, and federal budgets resulting from the construction of secondary treatment facilities and a recognition that ocean waters have a capacity to assimilate some waste-loading without undue ecological impact.

In the past, legislation and regulations for the protection of the ocean from pollutants have been directed toward prevention of pollutant inputs into the coastal waters. This, of course, is expensive to achieve and is basically unachievable. Recognition of the ineffectiveness of the single media (ocean waters) approach to pollution control has been long in coming. Waste disposal is not a single media problem--all wastes must be disposed of on land, into the air or the oceans--thus, waste disposal must be considered from a multi-media (land, air, and water) perspective. In the consideration of waste disposal from a multi-media perspective, it is assumed that even though disposal occurs into one of the media, the wastes, in one form or another, generally are transported between these media, and in many cases, actually end up in the oceans. With this perspective in mind, we would now like to examine the concept of assimilative capacity (Figure 1) as it relates to ongoing federal programs. These programs are (1) The NOAA Marine Ecosystems Analysis Program, which is currently in the NOAA Office of Marine Pollution Assessment (OMPA); (2) the NOAA Ocean Dumping Program also in OMPA; and (3) the EPA Section 301(h) Project.

The National Oceanic and Atmospheric Administration initiated the Marine Ecosystems Analysis (MESA) Program in 1972. The MESA Program provides a mechanism whereby the capabilities existing in the various

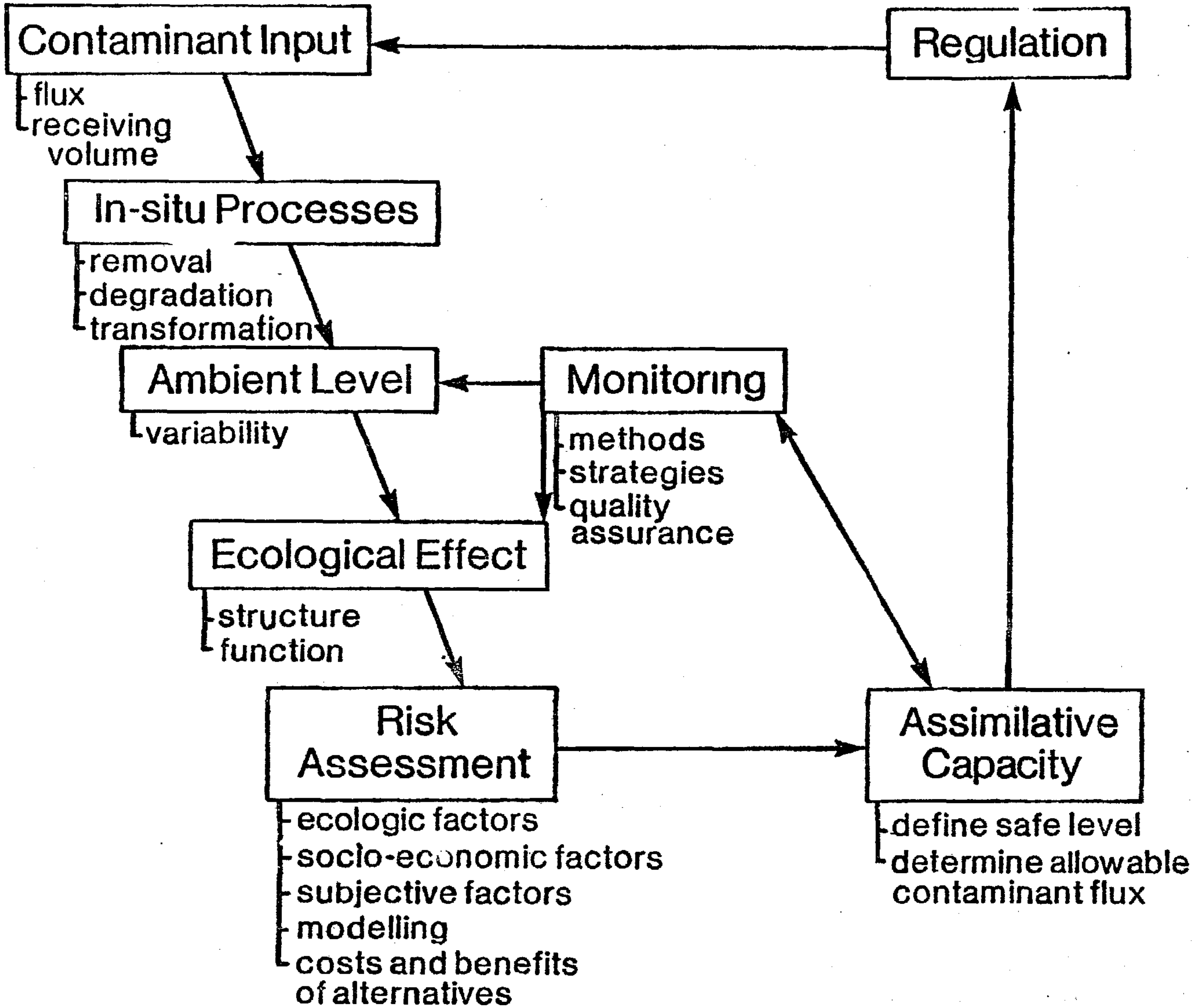

Figure 1. Conceptual diagram of the major components the concept of assimilative capacity.

NOAA organizational elements can be formed into a cohesive effort in selected coastal areas. The MESA Program serves as a focus for cooperative efforts with these and other federal, state, and local agencies, universities, industry, environmental organizations, and others to help investigate specific marine environmental problems which are beyond the research capability of any single governmental agency. Implementation of the MESA Program began in 1972 with the establishment of the New York Bight Project. In subsequent years, the Puget Sound Project and the Deep Ocean Mining Environmental Studies (DOMES) were initiated.

The objectives of the MESA Program were designed to accomplish the following:

1. Describe and understand the structure, processes, dynamics, and interactions of the marine ecosystem
2. Provide information for improved predictions of the effects of pollutants and other natural and man-induced changes upon marine ecosystems
3. Provide information and technical expertise to assist in development of effective management of the marine ecosystems subjected to conflicting uses
4. Identify critical parameters, sampling, and logistic strategies.

Achievement of these objectives focused upon the documentation of pollutant sources and input rates; distribution and concentrations of pollutants stored within the water, sediment, and biota; pathways through which pollutants move and processes (physical, chemical, and biological) which alter the form of these pollutants; and the effects and impacts the pollutants have upon the various elements of the regional ecosystem. The NOAA-sponsored Crystal Mountain Conference defined Assimilative Capacity as "the amount of material that could be contained within a body of seawater without producing an unacceptable biological impact." At least four factors are involved in determining assimilative capacity:

(1) representative biological indicators, including health, recreation, aesthetics, must be selected; (2) pollutants for which assimilative capacity is to be determined must be identified; (3) sources of selected pollutants must be identified and characterized; pathways, transformations, and sinks must be characterized; and effects of pollutants on biological indications must be defined; and (4) a threshhold of what constitutes an "unacceptable impact" must be set.

The technical approach used by MESA closely follows this concept of assimilative capacity with the exception of establishment of the threshhold level of "unacceptable impact." A major effort goes into developing information on representative biological indicators, pollutant identification and their sources, pathways, transformations, sinks, and effect for use by the regional resource manager. The philosophy established by the MESA Program assumes that the scientist is responsible for developing the technical information required for the management decision process. On the other hand, it is the responsibility of the resource manager to establish the threshhold between acceptable and unacceptable ecological impacts based upon the social and economic values that must be integrated with the scientific information.

The effectiveness of the MESA Program in assisting the regional managers has been excellent. The data acquired by the program, especially in the New York Bight Project and DOMES, has been used extensively in making environmental decisions. With regard to the determination of assimilative capacity, MESA data are probably adequate for some pollutants, with a major information gap being in the area of evaluation of acceptable risk and dose response of the ecosystem to pollution loading (Figure 2).

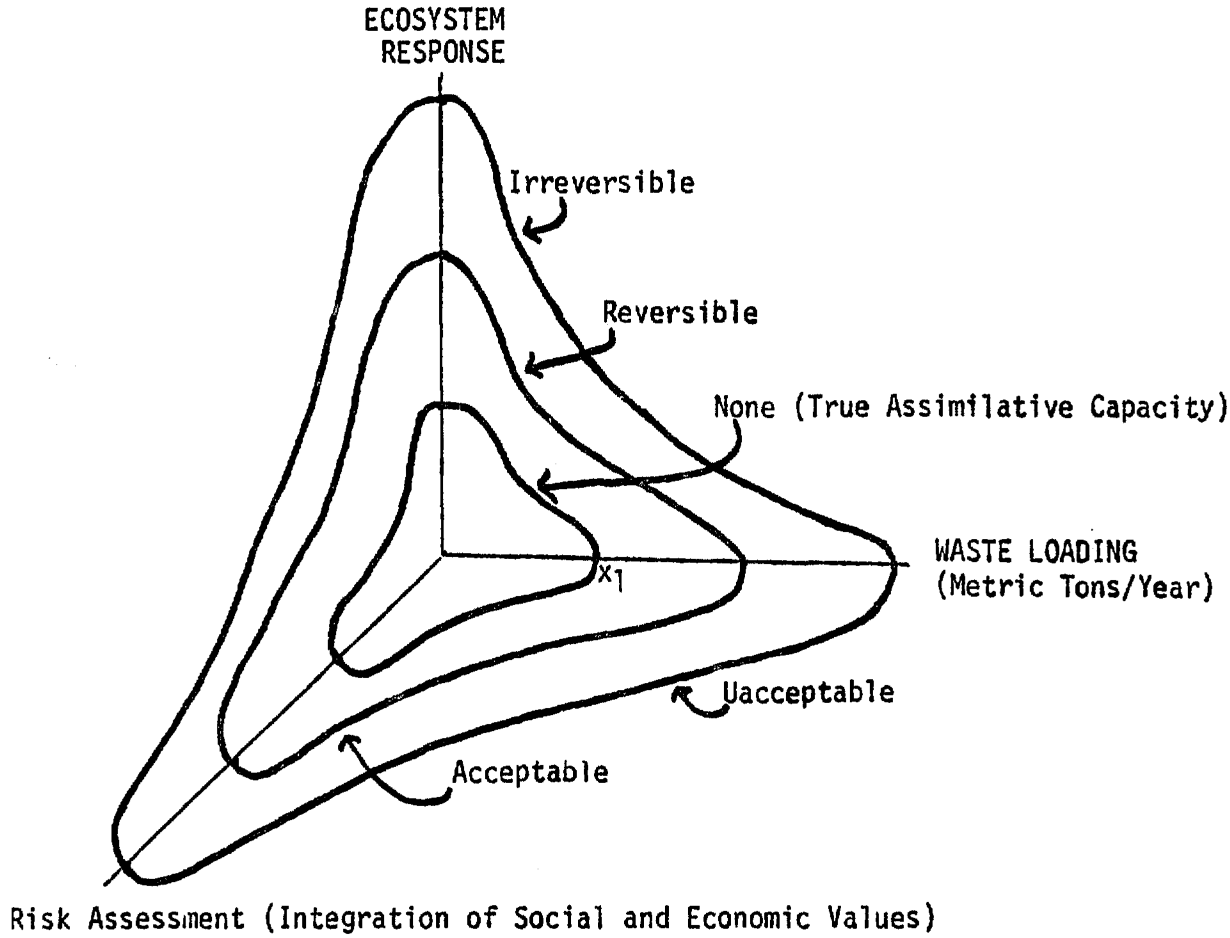

Figure 2. Risk Assessment Contours, illustrating integration of different social and economic values with ecosystem responses.
x_1 = True Assimilative Capacity.

It is anticipated that the MESA Program and other marine pollution studies conducted by the NOAA Office of Marine Pollution Assessment over the next several years will focus much effort toward development of the acceptable risk and dose response. A third program area that is approaching the assimilative capacity concept in its implementation is the EPA's Section 301(h) project. This project has been responsible for developing the regulations for the Section 301(h) of the Clean Water Act Amendments of 1977.

The Section 301(h) regulations provide for waivers to secondary treatment for municipal waste dischargers if they meet the following threshhold criteria:

1. Must have filed a preliminary application with the EPA in response to the proposed Section 301(h) regulations
2. Must have filed a final waiver application by September 1980
3. Must not have achieved secondary treatment at any time prior to submission of the waiver application
4. Must be capable of achieving a minimum of primary treatment
5. Must not dump sewage sludge into marine waters.

If a privately owned municipal treatment works (POTW) can meet the above criteria, its application can be considered for a permit with the discharge of wastes at less than secondary treatment. The application will be technically evaluated for the demonstration that with less than secondary treatment a Balanced Indigenous Population (BIP) will be maintained in the vicinity of the discharge pipe. In addition, the discharge area must achieve the state water quality standards, and drinking water supplies and recreational areas must not be impacted by the discharge. The applicant must also outline and provide an implementation schedule for a toxic control and a monitoring program which must be implemented if a waiver is granted.

Of particular interest relating to assimilative capacity and its relation to the Section 301(h) Program are the Balanced Indigenous Population (BIP) test, the Toxics Control Program, and the Monitoring Program. The BIP Test, simplistically, requires that the applicant demonstrate that continued discharge of municipal wastes at less than secondary treatment will not continue degradation (or prevent recovery) of the biological populations of the area. The test requires that the biological populations at the boundary of a zone of initial dilution around the discharge pipe (calculated area depending upon depth of water, size of pipe, and volume of discharge) be the same as the populations at a control site nearby but out of the influence of the discharged wastes.

A second major feature of the Section 301(h) regulations is related to the concern for the introduction of toxic material into the coastal waters. The applicant for waiver to secondary treatment must state that either the effluent contains no toxic material from the EPA list of 169 forbidden chemicals, or must provide an authoritative chemical analysis of the wastes which documents the concentrations of each of the toxic chemicals in the effluent. If the latter situation exists, where forbidden toxic chemicals are present, the applicant must describe a toxics control program that will eliminate these chemicals from the wastewater. The methods for removal (e.g., pretreatment or source control) is up to the applicant but the approach is to be documented in detail for evaluation and approval.

The third major element of the Section 301(h) regulations is the development of a monitoring program. This monitoring must be implemented within 18 months of receiving a permit waiving the secondary treatment requirement. The monitoring program must be designed to demonstrate that the balanced indigenous population is being maintained and that the toxic control program is effectively removing the toxics from the waste stream.

The implications of the Section 301(h) regulations are rather significant. In addition to recognizing that removal of toxics-chemicals is necessary and that there are serious economic impacts resulting from the construction and operation of secondary treatment facilities, they acknowledge that the degree of waste treatment can vary from region to region. Some areas will require at least secondary treatment to prevent environmental degradation, but other regions, due to physical and chemical oceanographic processes and the hardiness of the biological components of the ecosystem, can accommodate much larger waste discharges and still not affect the health of the regional ecosystem.

In summary, we believe in the need to focus our attention on the development of the concept of assimilative capacity and risk assessment methodology as it relates to the disposal of wastes into marine waters--particularly as we find more problems associated with waste disposal on land and in the air. Both land and air disposal appear, in most cases, to have a much closer and more immediate link to mankind and public health than ocean disposal.

It will be necessary for the scientific community to develop the specific types of information that the regional resource managers will need in the future to make their decisions. Methodologies are needed which integrate and weigh complex social, economic, and environmental issues into a decision-making equation.

BLM STUDY DESIGN FOR RESOURCE MANAGEMENT POTENTIAL

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BLM STUDY DESIGN FOR RESOURCE MANAGEMENT POTENTIAL

In preparing for this meeting three spearate thoughts arose while reviewing the materials provided:

1. Since the only reference to the Bureau of Land Management's (BLM) Environmental Studies Program is the Study Design for Resource Management Potential, the history and evolution of that design should have some bearing on the course of the conference.
2. The issues described in the charge to the panel on the Outer Continental Shelf Oil and Gas Activities are too mathematical and succinct for consideration under that term which, in the language of the Study Design, is reserved for complex matters of public concern which link technical problems and scientific unknowns with diverse management decisions and questions involving social, economic, temporal, and security factors.
3. The third and final significant point is the title of the conference itself. It implies an understanding that systems like the ocean, having been subjected to ubiquitous naturally occurring compounds like oil, have an evolved capacity for dealing with them, and it also implies that there is rapidly approaching a time when people, for lack of other alternatives, are going to push that capacity to the limit.

In order to understand the Study Design for Resource Management Potential, hereafter called the Blue Book Process, one has to consider its evolution as a function of the history of the Bureau of Land Management (BLM) Environmental Studies Program. The studies program has changed tactically from largely basic scientific surveys to applied research and development of analytic tools for predicting change in broad components of the functioning ocean system.

At the same time, the strategic and rhetorical base for the program has remained constant. As it was in 1974, its focus is to enhance the ability to make decisions related to the Outer Continental Shelf (OCS) across the board.

Key differences between the original baseline program and the present one are easiest seen in a schematic format. This obviously requires a graphic, but I will ask you to use your imagination. Any or all of the baseline studies can be depicted by a simple matrix. Imagine, if you will, that the wall behind me is a huge sheet of paper with lines ¼ inch apart spread horizontally and 1 inch apart, vertically. Across the top are all the things that one could possibly measure and along the side are all the places one could possibly measure them. All the measurables and places are prioritized. The closer they are to the upper left corner, the more direct is the relationship to oil and gas activities.

Although it is an oversimplification and subject to all the criticisms of generalizations, it does indicate that the major tactical detriment of success is whether or not all the time and money required to fill out the matrix will be available. They were not and, being subject to several revisions (the National Academy of Science reviews in particular), the program was overhauled and restructured over an agonizing 18 months.

In the Blue Book there are a number of diagrams of various issues broken down into component questions. In each case a study (or group of studies) is developed by establishing the basis for answering the specific questions or providing information (minimal) that is required to assure that informed decisions are made in a timely fashion.

Two other key elements in the Blue Book methodology (and marked differences from the earlier stage of the program) involve access for input into the issue identification and study plan development and the prioritization of studies on regional and national bases.

We originally attempted to use multi-disciplinary scientific workshops to structure the matrix for information needs for management decisions, but this, like the overall baseline approach, proved unrealistic largely because the workshops focused on things that might be done as opposed to things that must be done and channeled interest into narrow specialties where information was useful in advancing the state of the art while not necessarily increasing our ability to deal with the state of the situation.

Regarding the simplicity of the issues identified in the charge to panelists, we really have to consider how we frame issues in the context of the interests that a proposal is likely to affect. The ability of a system to convert something considered objectionable into something else is infinitely more complicated than the equations for chemical and physical factors that would describe that ability. In fact, the resolution of that issue is much more closely aligned to social, socioeconomic, industrial, environmentalist (as opposed to environmental), and large and small "P" political factors--all of which defy simultaneous, much less lasting, condensation into a reliable equation. The application of scientific principle and insight can only be aimed at guiding people in selection among available choices. No amount of science at any cost is going to provide definitive answers if, in fact, definitive answers are at all possible.

Issues are defined in broad terms to identify who is affected as well as identify what is possible and necessary to know. Hopefully, the scientific information provided in this way will guide people in exercising choices by pointing out the residual risks that are associated with any of the choices, not by choice leading them to expect a right choice.

Regarding the third point, I am convinced that we are in the midst of the controversy centering on assimilative capacity of the ocean right now and have been for some time. I am also convinced that we will do very little here to mollify that controversy and channel the public's energy and enthusiasm toward answers. The reason is that we all are probably too busy formulating scientific and <u>self-serving</u> questions. We have given the public the impression that <u>we</u> can resolve their problems by answering our questions, and all that we have been able to guarantee is that there are more questions. <u>We</u> have led people to believe that <u>we</u> can provide definitive systematic answers to problems when we know that in our lifetime we will not be able to make a definitive statement of how the ocean system operates much less how it is perturbed by our actions.

Finally, <u>we</u> have made it difficult, if not impossible, for scientific input to meaningfully effect resource management decisions by viewing problems as vehicles for single-mindedly advancing the "state of the art"--as opposed to using the "state of the art" to separate out those elements of a problem that are amenable to <u>factual resolution</u>, thereby insuring that the <u>judgments</u> made on the total situation are as informed as possible.

THE STATUS OF DAMAGE ASSESSMENT IN THE FEDERAL GOVERNMENT

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THE STATUS OF DAMAGE ASSESSMENT IN THE FEDERAL GOVERNMENT

Our charge today is to discuss "damage assessment" and to come up with some guidelines that will help the federal government come to grips with the difficult task of conducting these assessments.

"Damage assessment" has perhaps become one of the first bureaucratic buzzwords of the 1980s. As with most buzzwords, there seems to be a direct relationship between the frequency with which you hear the term and the lack of understanding and agreement on what it means, what it is, how you do one.

Before you launch into your discussions and debate, I have been asked to give a brief "status report" on why we are interested in these assessments, what our experience has been in the past, and how we hope to approach the future.

1. Why. There was much discussion in the just-concluded conference of the Center for Ocean Management Studies workshop about "superfund" legislation. It now appears that we cannot necessarily predict passage of superfund legislation in the immediate future, but we can assume that some legislation calling for an equitable oil and hazardous substances liability fund will eventually pass. If we are to implement such legislation, the need is obvious for an equitable means of determining damage and identifying appropriate types and levels of compensation or restoration. Some versions of pending superfund legislation include provisions for damage assessment on the belief that Congress cannot continue to

allow damage assessments to be done on an ad hoc basis--as they are now--with no formal guidelines or procedures. Such ad hoc assessments lead to inequities in how we react from spill to spill and even how we deal with different resources in an individual spill.

Even were we not faced with the possibility of legislation requiring federal agencies to identify the past state of the art procedures in damage assessment and implement them, we should be impressed with the logic of doing so. The most obvious reason for codified procedures is to identify and quantify in a comprehensive and systematic way those natural and other resources damaged in a spill. Currently, there are no standardized protocols for sampling, data collection, and monitoring of a spill. Though some progress is being made toward such standardization by the National Response Team and the interagency efforts under P.L. 95-273, lack of such protocols leads to case-by-case determinations that are open to endless criticism. Standard protocols would allow consistency in conducting damage assessments, choosing indicators of damage, applying the yardsticks or value judgments, and--we hope--lead to less arbitrary decisions in compensation, restoration, and future regulatory actions.

Perhaps in this day of budget crunching throughout the federal government, one of the strongest arguments for standardizing damage assessment would be to protect the taxpayer against unnecessary expenditures for unnecessary assessments or inappropriate related research and monitoring and for unnecessary or incorrect compensation of restoration actions.

One clear example of incorrect compensation would be the 6 cents per critter killed which was ordered by the court in the <u>Zoe Colocotroni</u>

case. This reflects only the value of certain critters when they are dead, pickled in formaldahyde, and shipped to your laboratory. As an example of incorrect compensation, Royal Nadeau of the Environmental Protection Agency (EPA) is fond of pointing out that you could restock the fish in a stream until you ran out of money in the U.S. Treasury, but if the habitat has been degraded to the point where it cannot support the fish life, you are wasting money on that particular restoration.

In addition, having established procedures for identifying important damaged resources and estimating the value in some way would allow us to prosecute more complete claims for damages, especially damage to such resources as wetlands and habitats for which no accepted replacement costs yet exist.

Finally, a sound damage assessment protocol could actually act as an incentive to potential spillers to use extreme care or avoid sensitive areas because they would be aware of procedures for putting a value on losses and establishing a spiller's liability.

2. Experience. Right now our ability to conduct a valid damage assessment depends upon your definition of damage assessment.

One of the first contributions we could make at this workshop called by the National Marine Pollution Program Office is to agree on a definition of damage assessment for use by the federal government. Are we really talking ecological impact assessment? economic loss? net change in the quality of life? all of the above? none of the above? Does everything or nothing have a dollar value? What is the bottom line in a damage assessment?

Over the past 15 years there have been a number of oil spills around the world for which some kind of damage assessment has been attempted. Most of these studies have been aimed at individual research questions or at a single set of resources which have been impacted.

In U.S. waters, the first major spill for which damage assessment was attempted was the Santa Barbara well blowout in 1969. The Santa Barbara studies focused on massive mortalities of various types of marine fauna. In the litigation that followed, the State of California sued the oil companies involved for damage to the state's natural resources and economy and for loss of taxes and proprietary income. A compromise settlement was reached without a legal determination of the proper measure of governmental damages.

A spill from the barge Florida in West Falmouth Harbor, Massachusetts, in 1969 was the first major spill for which an integrated scientific assessment was attempted. The study was concerned mainly with impacts to the benthos of Buzzards Bay, Massachusetts, and did not include any assessment of economic damages. The data were never used to support litigation.

The outcome of damage assessment for the Zoe Colocotroni spill off the southwestern coast of Puerto Rico in 1973 set legal precedent for the use of scientific data to compensate a government entity for environmental damage. District Judge Juan Torruella calculated the monetary value of the damage by multiplying the number of organisms killed by a per-organism replacement cost (taking the low end of a range between 6¢ and $4.50 from a biological supply catalog). A judgment of $6.2 million was entered against the defendant for damage to organisms and 20 acres of mangrove swamp habitat. Although assessment data were not sufficient to support claims for all the associated losses, this decision established a basis in federal common law for assessing natural resource damage from a spill of oil or other toxic substance.

A damage assessment following the NEPCO 140 barge oil spill in the St. Lawrence River in 1976 was conducted during the two-year period following the discharge. Study areas were identified by an International Joint Team, which also served as a steering committee throughout the duration of the study. This team was the by-product of efforts sanctioned in the National Contingency Plan. Primary study objectives included assessment of the spill impact upon indigenous biological populations, detection of residual petroleum hydrocarbons within affected ecosystems, determination of the extent of bioaccumulation of hydrocarbons, and socioeconomic impacts upon local communities--the first time EPA had included socioeconomics in its damage assessment work.

In 1976 the Argo Merchant ran aground off the coast of Massachusetts, spilling 170,000 barrels of No. 6 fuel oil into the northwest Atlantic. Within two days a massive scientific investigation began, coordinated by the Spilled Oil Research Team of the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard (USCG). The Argo Merchant spill studies, however, were generally inconclusive and did not, for the most part, quantify impacts on natural resources in the region. Nevertheless, the scientific effort was the first step toward damage assessment contingency planning in the United States. In a series of jointly sponsored workshops around the country, NOAA and EPA assembled and exchanged scientific information related to oil spills and began activities which have resulted in formalization of the Scientific Support Coordinator role in the National Contingency Plan and mechanisms to provide scientific advice during spills and a framework for research and damage assessment.

When the supertanker Amoco Cadiz was grounded on the coast of Brittany, France, in March 1978 and subsequently broke up, it released what was at that time the greatest single spill in maritime history.

As we heard Monday, two distinct studies of damage from the Amoco

Cadiz are being conducted: an ecological study of oil impact and NOAA's economic investigation of French losses through fisheries, tourism, and indirect effects on the economy. Methodological advances in economic damage assessment made during the Amoco Cadiz investigations will be employed in future damage assessments, but the studies that point to a $400 million damage figure have made no attempt to estimate damage to the marine environment.

On June 3, 1979, the Ixtoc-I well blew out in the Bay of Campeche, Mexico. Before the well was capped on March 23, 1980, approximately 3 million gallons of an estimated 140 million gallons of spilled oil landed on the south Texas coast. Because of the distance of the spill from U.S. waters, a generous lead time was available so that numerous federal and state agencies could plan their battle against the oncoming oil and define objectives for a damage assessment.

In addition to lead time, another advantage available at this spill was the fact that revisions to the National Contingency Plan had provided an outline of the role of scientific support and general guidance for damage assessment coordination and planning for spills. But the Plan does not define damage assessment nor provide for an organization to carry out this responsibility. Thus, ad hoc management by federal and state agencies was the only available approach.

Responsibility for scientific studies and assessment planning without financial support from the Contingency Plan Pollution Fund was delegated to NOAA. The scientific studies which were made focused on ecological damage assessment. Meanwhile, in July 1979 the ad hoc damage assessment team began the planning of a comprehensive, long-term approach to investigating the possible consequences of the Ixtoc spill. The consensus of the planning group was to focus on an economic endpoint for the program, rather than more traditional ecological assessment. Thus, the focus was on important resources as determined by economic use or legislative mandate. Emphasis was also placed on habitats and food resources known to be required to maintain these important resources. Using such an approach, the study would then produce products that could be useful in the legal system, in liability, compensation, and international conventions that are better served by dollar value loss information than by losses expressed in ecological terms. Studies were to be focused on (1) human health; (2) commercial and recreational fishery resources; (3) marine mammals, birds, and endangered species; and (4) socioeconomic factors.

A management team for each set of studies was envisioned with each team comprised of an economist, lawyer, and appropriate scientific expertise. Integration and synthesis of the damages beyond the four elements was not planned because drafters of the plan felt each set was an endpoint in itself with different approaches and techniques to assess the damages and different methods of converting impacts to a dollar value. They simply planned that, after each team had defined its economic loss, a total assessment of damages could be made through simple addition of losses for each area. Successful completion of the program could have provided a first attempt at comprehensive evaluation and quantification of impacts for a major oil spill on national, state, and local resources.

Although the Ixtoc Interagency Damage Assessment Program was not funded, and we are--once again--going about these important studies in a piecemeal and ad hoc way, we did get some loud and clear messages about damage assessment. (Or rather, I did, I shall not presume to speak for all the federal government, all of NOAA, or even all of my people who worked on Ixtoc.)

Keep in mind, as I give my conclusions, that the proposed interagency damage assessment started out as a plan for $12 million and five years of study and was whittled down only as it made its tortuous way through the maze of federal budget considerations. My conclusions are these:

1. We scared the system to death with that plan.

For the future, we have to find a way to make damage assessment relatively quick and simple and inexpensive. It cannot require obscure expertise or include long-term esoteric research goals. Those have appropriate places in other research, but not in damage assessment.

2. We had to spend too much time and effort deciding what to study and compromising to take all of the preferences of the various agencies into account.

For the future, we must have a generic plan that structures the study and provides for coordinated action.

3. Although we made a valiant effort to deal with what I call the "dead bodies to dollars correlation," we are sorely incapable of converting ecological damage to economic loss at this time.

For the future, we need a method of assigning values to kinds of injuries. I personally do not believe we can ever sell the idea that we should give each spill a dollar value--the pitfalls are too great--but I do see value to be gained in trying. We will learn a lot in the process. At NOAA, in some of our discussions of a generic damage assessment project, we have talked about creating an aggregate measure that could be calculated from a set of parameters and would result in a single number that would be accepted as an indicator of value and could be compared from one spill to another.

This has been best described by the people who do our mathematical modeling for spill trajectories as producing a value similar to the Dow-Jones Average or the wind chill factor--both commonly accepted numbers that are meaningful to most people even though they may not know all the parameters that go into devising the single figure.

4. We cannot assess the whole world after every spill.

For the future, damage assessment studies have to be doable and reproducible. We have to do a better job of finding indicators to assess instead of attempting to measure impact on everything that is in sight.

Perhaps there are useful indicators which are not necessarily natural members of the impacted community. I am reminded of the canaries which coal miners take into the mines as an early warning of toxic fumes. If the canary--which is much more fragile than man--dies, the miners leave the mines immediately. The point is that small effects on a known indicator may be easier to measure sooner than major effects on the total area.

5. Finally--this one is hard to say--there is no damage if there is no customer. There may be impact, but damage, like beauty, is in the eye of the beholder. If no one cares about the changes, the impacts caused by the spill, it is hard to say there is "damage."

For the future, we must do a better job of identifying the customers or users of damage assessment information and assure that our studies respond to their needs in terms of the questions we answer, the time frame in which we work, and the form in which we provide information. That--and only that--in today's economic climate will assure stable funding for damage assessment.

MARINE WASTE DISPOSAL

PANEL REPORT

Moderator:

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MARINE WASTE DISPOSAL: CHARGE TO THE PANEL

The purpose of this panel is to review past practices in marine waste disposal management and related research in general and to recommend new approaches to better define potential problems and information needs. Essentially all marine waste disposal decisions are assimilative capacity decisions in the broad sense of the term. In most cases, however, the concept is not rigorously applied. The key working paper for this panel is the Crystal Mountain workshop proceedings, "Assimilative Capacity of U.S. Coastal Waters for Pollutants," Edward Goldberg, editor. These proceedings provide an illustrative example of the problems and potential of developing rigorous assimilative capacity assessments. It should be noted that the process is more important than the actual numbers derived. Assimilative capacity is proposed as an organizing concept to stimulate discussion, and the panel is asked to identify other organizing concepts (if they exist) that might have more useful scientific, environmental, and social implications.

Given the general guidance to the workshop and the results of the Crystal Mountain workshop, the panel is presented the following tasks and questions:

1. Review and critique current approaches to making assimilative capacity decisions in each of the following important areas of marine waste disposal:

    Municipal and industrial outfalls

    Sludge and industrial waste dumping

    Dredged material disposal

    Ocean disposal of radioactive wastes

2. What approaches have been taken to design research and monitoring programs to provide information for the key decisions in each of the above marine disposal areas? How effective have these strategies been?
3. Does assimilative capacity provide a useful concept for identifying information needs and priorities? What are the scientific, environmental, and social implications of adopting this concept to determine research and waste management policies? What are the alternative concepts and approaches?
4. What strategies can be proposed that will recognize (1) the differences between scientific and social-value considerations involved in determining assimilative capacity and (2) the complex interplay between these two sets of considerations.
5. Recommend new or improved strategies for identifying information needs and priorities in order to make better decisions related to marine waste disposal.

1. Assimilative capacity provides a useful model for the formulation of research related to marine waste disposal.

Assimilative capacity is defined as the amount of material that can be introduced into a body of seawater without producing an unacceptable impact. Applying this concept to marine waste disposal involves three primary considerations. First, the goal of zero waste discharge to the marine environment which can be inferred from present regulatory policies may be unrealistic and unnecessary for particular types of wastes. Second, a major research objective should be to establish the relationship between waste input and environmental impact. Third, the level of impact which should limit waste disposal in the ocean is necessarily a subjective and social judgment of what is unacceptable.

2. An assessment of assimilative capacity for a portion of the marine environment should be accompanied by a similar assessment for other environmental systems which represent alternative sites for the disposal of a particular waste.

The disposal of sewage sludge and effluents provides an example of a waste disposal problem which has generated concern in the marine environment. Organic matter, micro-organisms, heavy metals, and synthetic organic compounds represent some of the constituents which must be considered in sewage treatment and disposal practices. Ideally, one would like to oxidize the organic substances, kill the pathogenic micro-organisms, and return the heavy metals and nutritive elements, such as nitrogen and phosphorus, to their natural geochemical cycles. This process might be accomplished in the marine environment, by land application or composting, or by incineration or pyrolysis in the air. It is inadequate to reach a judgment of the marine environment's assimilative capacity for such wastes without also considering the impact of land-based disposal on groundwater quality and the impact of atmospheric disposal on air quality.

3. An evaluation should be made of the dependence of the marine environment's assimilative capacity on time and space scales, because this capacity is dependent upon the rates of natural processes.

It is evident from existing information that estuaries, such as San Francisco, Chesapeake, Delaware, and Narragansett bays have more limited assimilative capacities than open coastal regions, such as the Southern California Bight or the offshore environment of Deepwater Dumpsite 106 (DWD-106). Similarly the Great Lakes represent an aquatic environment which approximates a closed system on moderate time scales. Identification of those areas of the marine environment where problems have been recognized as resulting from waste disposal practices would be helpful in identifying those areas of greater and lesser assimilative capacity.

4. A substantial data base and a predictive model exists from the Southern California Coastal Water Research Project (SCCWRP) which should be examined, extended, and applied to other areas.

Sufficient information may exist to use the SCCWRP results as a case study to demonstrate the utilization of assimilative capacity in formulating waste disposal policy. Examination of the SCCWRP results may permit the identification of the essential data and the effective methodology for making assimilative capacity assessments in other marine environments.

5. A research program should be conducted to empirically assess the assimilative capacity of an oceanic region for present waste disposal practices.

The disposal of acid iron wastes at DWD-106 and in the New York Bight provides a relatively simple case in which an assimilative capacity assessment could be made. Sewage sludge disposal or contaminated dredged material disposal are quantitatively more important disposal problems which should be examined in terms of assimilative capacity.

6. A two-stage process might be possible for marine waste disposal management: the first would consist of an initial screening of a waste for acceptability prior to marine disposal, and the second would be a research and monitoring program to be implemented after disposal begins to assure that the assimilative capacity is not exceeded.

The pre-disposal screening process could be based on existing laboratory evaluations, such as bioassay, octanol water partition measurements, or weak acid leach analyses to predict the environmental behavior of the waste beyond simply its chemical composition. If these tests do not indicate detrimental environmental effects, the waste should be permitted to be disposed in an appropriate marine environment, and environmental studies and monitoring should be conducted to assure that the assimilative capacity is not exceeded.

7. Data should be compiled on the sources and the mass balance of contaminants entering various portions of the marine environment around the United States.

An assessment of marine waste disposal in most regions of the United States is limited by inadequate information on the chemical constituents, their sources and their mass balances, as they are discharged into the marine environment. Many of the standard water quality parameters, such as "total suspended solids," "oil and grease," and "biological oxygen demand" do not provide the information one needs to manage marine waste disposal practices.

8. In addition to the assimilative capacity concept for marine waste disposal, attention should be given to alternative approaches for specific wastes, such as critical path analysis and waste trajectory analysis.

Critical path analysis has been used by Great Britain in its consideration of radionuclide disposal in the ocean. Attempts have been made to define the way in which radionuclides introduced to the ocean could return to man. The most conservative approach to regulating radionuclide disposal is then achieved by assigning maximum probability to the critical path which leads from the ocean to some portion of the human population. Waste trajectory analysis is an approach in which one traces the fate of a contaminant introduced into the ocean as it is transported and modified by the biogeochemical processes active in the ocean. With sufficient understanding of these processes, it should be possible to predict the trajectory and the partitioning of a contaminant among various reservoirs of the marine ecosystem.

9. Provision should be made to learn from episodic events in the marine environment in order to better anticipate the fate of marine pollutants.

A number of examples exist where a crisis or an episode has occurred which, if properly studied, would yield valuable information related to marine pollution. The grounding and breakup of the Argo Merchant on Georges Bank, the Ixtoc Blowout, the 1976 New York Bight Anoxia event, and the flooding of the Susquehanna River and Chesapeake Bay by hurricane Agnes provided significant opportunities to document the impact of large-scale chemical perturbations in the marine environment. In each of these cases efforts were made by researchers on an ad hoc basis to learn as much as possible from the episode. However, in most cases mechanisms did not exist to provide a long-range study of the event. Some contingency plan and flexible resources could enhance the ability to learn from episodic events in the marine environment.

10. An assessment should be made of the benefits and hazards of chlorination of discharges in seawater.

Residual chlorine from chlorination processes can produce chlorinated organic substances and brominated organic substances in seawater. Are the benefits of chlorination for marine discharges sufficient to accept the risks of producing carcinogenic organic substances?

11. An effort should be made to document the consequences to man of marine pollution.

Protection of human health is a well-recognized endpoint for the management of marine waste disposal. One basis for identifying whether the assimilative capacity of a region has been exceeded is to conduct a survey of human health among portions of the population with the greatest exposure to the marine environment (swimmers, fishermen, etc.) and test for statistical correlations between their health and their marine exposure. Such a study could be useful in a region where the marine pollution stress is believed too great, such as the New York Bight, confined estuaries, or portions of the Great Lakes.

12. Studies should be conducted on the recovery of a marine environment after the elimination of a pollution source.

By understanding the recovery of a pollution-impacted marine environment, it will be possible to determine the reversibility of the alteration. The continental shelf dumpsite formerly used by the city of Philadelphia for sewage sludge disposal provides a good opportunity for a pollution recovery study because it was well characterized prior to cessation of disposal operations.

13. The use of sentinel organisms as endpoint indicators for assimilative capacity assessment should be investigated.

As canaries in mine shafts have protected people from excessive toxic gas exposure, there may be naturally distributed or artificially emplaced marine organisms which could provide an early warning of the assimilative capacity endpoint. The Mussel Watch program has been examining this approach with success, and additional research along these lines may be fruitful.

14. An examination should be made of alternative procedures for ocean waste disposal operations.

Pipeline discharges achieve a moderate initial dilution of a waste of 50-200-fold at a fixed location. Dispersion in the wake of a barge results in an initial dilution of 5,000-10,000-fold, and the point of input need not be at a fixed location. Disposal of wastes on the continental shelf or in estuaries maximizes the potential conflict with other marine resource utilization compared with deep ocean disposal. It can be argued that the present practices of placing wastes in the photic zone above the continental shelves maximizes the impact of these wastes on the ocean. Adequate consideration has not been given to alternative methods of waste disposal and their relative impacts on the ocean and on man. For example, should wastes be injected beneath the thermocline rather than in the mixed layer?

MARINE WASTE DISPOSAL

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OCS OIL AND GAS DEVELOPMENT

PANEL REPORT

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OCS OIL AND GAS DEVELOPMENT: CHARGE TO THE PANEL

Assimilative capacity has been considered as "the amount of material that could be contained within a body of seawater without producing an unacceptable biological impact" (Goldberg 1979). The definition of levels of biological impact associated with a specific use of the oceans or its resources is a first step in this process. Under the existing regulatory structure, "management of the outer continental shelf shall be conducted in a manner which considers economic, social, and environmental values of the renewable and nonrenewable resources contained in the outer continental shelf and the potential impact of oil and gas exploration on other resource values of the outer continental shelf and the marine, coastal, and human environments" (OCS Lands Act Amendments of 1978 Section 18(a) (1)). To develop the required analysis, "The Secretary shall conduct a study of any area or region included in any oil and gas lease sale in order to establish information needed for assessment and management of environmental impacts on the human, marine, and coastal environments. . ." (OCS Lands Act Amendments of 1978 Section 20(a) (1)). The interpretation of these requirements has been spelled out in some detail (USDI-BLM 1978).

Application of the assimilative capacity concept to this regulatory structure raises a number of issues: First, what is the relative importance of the source of a given pollutant with respect to other sources of the same pollutant? Second, what level of total release is excessive for a given pollutant? Third, what is the relative importance of effects from one pollutant versus other factors for a given renewable resource? Given the concept of assimilative capacity and the existing regulatory structure, the panel is asked to develop an appropriate strategy for the 1980s and specifically address the following tasks and questions:

1. Review and evaluate, in general, current approaches to developing environmental information in order to make sound decisions related to OCS leasing.
2. What advantages are there to applying the concept of assimilative capacity to situations involving "risk of accidents," such as the OCS decision process? Disadvantages?
3. Does assimilative capacity provide a useful concept in identifying information needs and priorities relative to OCS development? Does it allow for a more realistic evaluation of the environmental risks related to OCS development relative to the overall assimilative capacity of the environment? What are the scientific, environmental, and social implications of adopting such an approach?
4. Recommend new or improved strategies for identifying information needs and priorities in order to make better decisions related to OCS development and improve resource management capabilities.

OCS OIL AND GAS DEVELOPMENT: PANEL REPORT

Introduction

The development of oil and gas resources on the outer continental shelf (OCS) has been one of the most controversial marine issues of the past decade. Concern over the potential environmental impact of oil and gas developments has spurred research efforts on all aspects of OCS operations. It must be recognized, however, that oil and gas operations contribute only a small portion of the total volume of specific pollutants introduced into the oceans (2% for oil and much less for other pollutants). Nonetheless, oil spills and chronic discharges from OCS operations can damage valuable living resources in the immediate area. In light of the potential impacts, it is appropriate that OCS pollution related research efforts should focus on critical ecological areas.

The probable risks associated with various levels of oil and gas activities can be relatively easily determined for any given area. We have a variety of models which estimate the impacts of oil spills and other pollutant releases under different conditions. It is much more difficult, however, to determine what level of total release is "excessive," given the potential impacts. Society must decide the level of "risk" it is willing to accept. In making this decision, we should recognize the relative importance of effects from OCS pollutants versus other factors. For example, climatic conditions probably have a greater impact on fisheries production than pollution except in relatively closed systems. We must recognize, however, that we do not fully understand all the factors affecting marine ecosystems. Therefore, it is important that we continue to study the direct and synergistic effects of oil and drilling muds associated with OCS activities. However, the level of this research effort relative to other important scientific studies should be reassessed.

Discussion of Charge

The following discussion reflects the panel response to its charges. Review and evaluate, in general, current approaches to developing environmental information in order to make sound decisions related to OCS leasing.

The current approaches are both prospective and retrospective. Approximately 80% of our research efforts are focused on predicting the impacts of OCS activities, and 20% is allocated for monitoring programs. There is some serious question as to the structure of the research efforts and the credibility of the data base developed by these efforts. The four charges are not really necessary to the report. The concern was voiced that the same types of questions are asked repeatedly when lease sales are contemplated. It was agreed that the research/monitoring strategy should address these questions in a comprehensive way early in the process. The panel felt that the concept of assimilative capacity could be a significant help in determining the type of data to be collected. In regard to the credibility of the research effort, the panel expressed the opinion that an ongoing peer review system should be developed to evaluate the quality of data produced in these programs.

What advantages are there to applying the concept of assimilative capacity to situations involving "risk of accidents," such as the

OCS decision process? Disadvantages?

The most obvious advantage to applying the assimilative capacity concept to OCS operations is in helping to define and focus research and monitoring strategies. An attempt can be made to define "speed limits" for OCS operations in terms of what scientists judge to be acceptable and/or unacceptable impacts on human health and damage to other resources, etc. These speed limits can be continually revised as societal needs and pressures change. The disadvantages of the concept center around our limited capability to predict impacts or define what is unacceptable. This is especially true for the myriad of substances that have been recognized as toxic but for which virtually no data on fates and effects exist.

Does assimilative capacity provide a useful concept in identifying information needs and priorities relative to OCS development? Does it allow for a more realistic evaluation of the environmental risks related to OCS development relative to the overall assimilative capacity of the environment? What are the scientific, environmental, and social implications of adopting such an approach?

The assimilative capacity concept does provide a useful structure for identifying information needs and priorities relative to OCS development. It could be very valuable in identifying critical information gaps and developing programs to fill these gaps. It is not clear, however, that it aids directly in the evaluation of risks. Rather, it is the role of risk assessment to define the acceptable or unacceptable impacts which scientists and planners will present for societal judgment. Then, after all risks are evaluated, a program can be developed to test the system to see if the resulting defined assimilative capacity is exceeded. This approach in OCS matters should lead to better focused environmental research and monitoring programs and an assessment of environmental impacts based upon the acceptable levels of environmental quality determined by society. Essentially, assimilative capacity provides a framework within which scientists can present the results of their research to society along with recommendations as to the implications of these results in such a way that society can judge their value and accept, reject, or revise the recommendations.

Recommend new or improved strategies for identifying information needs and priorities in order to make better decisions related to OCS development and improve resource management capabilities.

The panel believes that the assimilative capacity concept could assist us in the development of new and improved research and monitoring strategies. Specific suggestions for applications of this concept include: (1) developing a series of maps depicting the degree of vulnerability of specific environments to pollutant, (i.e., the relative assimilative capacity of the various environments which could be impacted, (2) developing a series of maps showing the degree to which the assimilative capacity is presently exceeded or approached for various pollutants in U.S. coastal and shelf waters. There are more potential applications of the assimilative capacity concept which could assist us in making OCS decisions. However, the decision-making process itself has some special needs.

Regardless of the initial structure or design of any research and monitoring program the credibility of the data and conclusions will always be questioned unless they have been thoroughly reviewed. This concern can be minimized if the research is conducted by established "Centers of Excellence." However, the panel believes that a peer review system developed within an organization such as the National Academy of Sciences or another "neutral" institution would best resolve the credibility problems. If a peer review panel cannot reach consensus on the quality of the data, the issue in dispute could go before a science court which would make a ruling on the acceptability or nonacceptability of the research results.

Summary of Recommendations

1. The concept of assimilative capacity should be applied to OCS research and monitoring strategies.

Environmental impacts must be considered in all OCS oil and gas decisions. The concept of assimilative capacity can and should be utilized in any OCS environmental assessment. We must always consider the amount of material (oil, drilling muds) that can be assimilated by a given body of water without producing an unacceptable impact and what level of release will cause this impact. Research efforts should first determine the levels of release which will cause varying impacts. Scientists then have the responsibility to consider and recommend limits based on their knowledge. In instances where it is difficult to establish a limit, scientists should make a conservative estimate. The system can then be tested through a monitoring strategy to see if it ever approaches this limit and whether or not any potential problems exist.

2. <u>Society must make the final determination of what is an "acceptable" or "unacceptable" level of environmental impact through its courts and political processes</u>.

In certain situations society may be willing to trade-off a significant biological loss for an economic gain. For example, a 20% decline in a fishery over a 10-year period may be an acceptable loss, given energy alternatives. However, if the environmental impact would be irreversible, there may be some second thoughts. Obviously, there is a price we are prepared to pay for various levels of environmental protection. The problem is determining the resources at stake and their relative value. It is our obligation to provide this information to society. In turn, society must then evaluate the "risk" of the given action relative to the "risk" of no action. That is, environmental impacts from OCS activities must be evaluated in light of other contributing environmental factors and the social/economic implications of the decision.

3. <u>OCS research and monitoring strategies should be both prospective and retrospective, and structured to assess the level of impact relative to the "assimilative capacity" of the area</u>.

To test how close we are to the "assimilative capacity" of an area, the research/monitoring strategy must have both forecast and hindcast components. Predictive research which attempts to define the outcomes of specified or projected pollutant releases should be applied to the existing leasing process. It is, however, a carefully planned monitoring strategy which will identify unexpected problems in a timely manner. For example, the DDT problem would have been recognized earlier if there had been an appropriate monitoring program. When ongoing monitoring programs indicate significant changes, we should then "fine tune" our predictive research efforts. Likewise, if research efforts indicate potential problems, then the monitoring strategy should be redesigned to evaluate those concerns. Thus research and monitoring strategies should complement one another.

4. OCS research and monitoring strategies should focus on identifying processes which cause unmistakable signals when impacted by oil and gas developments.

The relative importance of oil and gas activities versus other factors in causing an impact must be determined if the regulatory agency is to establish acceptable or unacceptable levels. We must ask the question, "Can the signal from impacts of a given pollutant (i.e., oil) on a resource (i.e., fish) be differentiated from noise level variations in the resource itself?" Every effort should be made to identify the warning signs. Once these signals are apparent, the relative importance of the impact must be assessed in terms of its extent and reversibility. We recognize that, given the present state of knowledge, it will be difficult to establish cause and effect relationships, particularly in light of synergistic interactions. Future research efforts should therefore focus on identifying processes which would be affected, and monitoring programs should be designed with appropriate controls.

5. <u>A peer review system for controversial OCS related research/monitoring efforts should be established.</u>

Research and monitoring results will always be seriously questioned unless they have been reviewed by a recognized panel of "experts." Foundations, professional associations, and publishers have successfully used the peer review system for years. To assure the credibility and acceptability of information and conclusions resulting from OCS research/monitoring activities, it is essential that a peer review system be applied to all OCS related research/monitoring efforts that could be controversial at both the proposal and publication stages. Such a review can also be applied to a body of data that has already been collected. For example, there is much dispute over the impacts of drilling muds. Although there have been numerous studies, there is still no agreement on the "facts." A well recognized panel of experts serving as a science court, could review the data base and judge the conclusions.

OCS OIL AND GAS DEVELOPMENT

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HAZARDOUS MATERIAL SPILL DAMAGE ASSESSMENT

PANEL REPORT

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HAZARDOUS MATERIAL SPILL DAMAGE ASSESSMENT: CHARGE TO THE PANEL

In the past, damage assessments have been among the most ad hoc of all government activities conducted during and after a major spill of oil or other hazardous substances. Several actions are now at hand which mandate an end of the confusion surrounding damage assessments and argue for the implementation of formal damage assessment protocols and improvements in the current state of the art for assessing natural resource damage.

The panel will be briefed on past damage assessments as they have been conducted by the major involved federal agencies: the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), and the Department of the Interior. It will be apprised of new actions of the National Response Team to come to grips with the damage assessment problem as it relates to the National Contingency Plan and will be brought up-to-date on the status and expectations of "superfund" legislation which may require and provide funding for standardized government damage assessments.

Following this briefing, the panel will be given copies of a draft of NOAA's proposal for developing a generic damage assessment program within the agency. The panel will be asked to review NOAA's approach in light of the state of the art (as discussed in the briefing and subsequent discussion) and to use the proposed NOAA approach as a starting point for discussions and recommendations identified in the following workshop outline:

Outline for Workshop Discussion

1. Identify important social indicators of damage, whether perceived or real.

2. Identify important scientific indicators of damage, both immediate and long-term.

3. Can the social indicators be used to better focus government research efforts?

4. Can scientific efforts impact the social perceptions?

5. Given the current state of the art of damage assessment and relevant scientific disciplines, are we capable of answering the relevant questions raised by 1 and 2 above?

   (For example: Does the information exist and can it be pulled together? If it does not exist, do we know how to develop it? If techniques do not exist for producing the information, what are the alternatives?)

6. Can we define a "damage continuum" for the important indicators which have been identified?

7. Identify the critical points along the selected continuum at which response and mitigatory actions should begin.

   (For example: Do nothing, attempt to prevent impact, attempt to mitigate damage, restore resource, etc.)

8. Recommend ways to improve the application of damage assessment results to the decision process.

Note: Workshop discussions are intended to stimulate ideas about (1) specific new challenges in the form of decisions, policy changes, and increased resource use which will face society and government decision-makers in the 1980s; (2) new strategies which can be proposed to provide better and more timely information to the government process; and (3) suggest ways to strengthen and clarify the link between social perceptions, scientific findings, and government policies.

Any one item on the outline could occupy the entire workshop. Or participants could decide they are not qualified to discuss a particular item. It is hoped that panelists will discuss all items on the outline, in order, and will draw conclusions or make recommendations on each point. If conclusions or recommendations are not possible, it is hoped that panelists will attempt to identify why they are incapable of reaching a conclusion and discuss what additional information or expertise is necessary to facilitate that end.

HAZARDOUS MATERIAL SPILL DAMAGE ASSESSMENT: PANEL REPORT

Purposes and Goals of a Generic Damage Assessment Program

1. If society is to consider all of the costs, as well as all of the benefits, from man's use of the ocean, then it is necessary to include the costs of pollution as part of the social cost of each activity. A damage assessment program provides a framework for evaluating the social costs resulting from the discharge of wastes into the marine environment.

2. A damage assessment program provides a basis for establishing procedures to estimate compensation for the victims of marine pollution. The measure of damages is the amount that would have to be paid victims to make them no worse off, following the pollution incident, than they were before.

3. To the extent that the party responsible for the pollution is made liable for damages, a built-in incentive is created to adopt measures to avoid pollution. Damage assessment, therefore, is part of a program to manage the marine environment by creating an incentive system designed to internalize the effects of marine pollution so that damages are borne by the polluter.

4. A comprehensive damage assessment program can contribute to public policy. For example, proposed policies to change shipping routes or to regulate tankers or offshore oil development impose costs on society. Presumably society wants to compare the benefits to be achieved (the damages avoided) with the extra costs. A damage assessment program provides the organizing principles for evaluating damages

from marine pollution--or, what is the same thing, for estimating the damages avoided. A damage assessment program thus can be used in public policy to compare the benefits (damages avoided) with the potential costs of proposed policies to avoid or mitigate marine pollution.

Measurement of Damages from Marine Pollution

One or more measures must be used to quantify damages. The use of market data provides a measure of value for goods and services damaged as a result of marine pollution and is consistent with the purposes and goals of a damage assessment program outlined above. Where possible, damages should be measured as the amount which would have to be paid the victims to make them no worse off than before the incident. This concept is consistent with the notion of damages used in many court settlements; punitive damages, however, are a legal construct and are not economic damages in the sense of damage assessment considered here.

The concept of the market value of damages can be applied relatively easily to such costs as cleanup and damages to personal property. It is more difficult, however, to measure the damages, especially long-term damages, of marine pollution to commercial fisheries, and it is considerably more difficult to quantify the damages suffered by users of recreational beaches or to measure other non-market-value damages. It is particularly hard also to quantify damages to the natural environment.

A number of issues and alternative approaches for quantifying damages were discussed. These included the use of a systems approach and methodologies presently being used to predict the socioeconomic impact of liquified natural gas (LNG) and other hazardous materials, sites, and routes.

The use of survey techniques to measure individuals' willingness to pay or sell to avoid pollution was discussed briefly, and some of the problems with this approach were mentioned. For example, respondents may engage in gamesmanship and provide misleading or exaggerated answers. The concept of replacement cost as a measure of damages was discussed, with the Puerto Rico oil spill as an example. A procedure for attempting to relate, proportionately, the area of coastal wetlands damaged to damage to commercial fisheries also was reviewed.

In general, the discussion focused on the state of the art with respect to quantifying damages, particularly damages to natural environments and to resources where non-market values are important, e.g., recreational beaches. The question of proof was raised: What constitutes proof of damages? The predictive aspect of damage assessment also was raised. That is, in trying to assess what the damages from a potential pollution incident could be, there is a need to relate risk to exposure in a quantitative way.

The role of public perceptions of damages from marine pollution incidents also was discussed. People react to perceptions; for example, tourists from Germany avoided Brittany in 1978 because they erroneously believed that all beaches were polluted. There was a clear public outrage following the Amoco Cadiz oil spill, and public concerns perhaps accompany all marine pollution incidents. However, we do not seem to have a methodology that can quantify the environmental insult, or psychological shock felt by people, following a pollution incident. It was suggested that public perceptions may be reflected in how much people would be willing to pay for real estate. The usefulness of using changes in property values to measure social perceptions to marine pollution was discussed. This approach in principle would provide an estimate of damages; however, in practice it would be difficult to separate pollution from other factors determining property values.

In general, it was agreed that there have been many imaginative attempts to quantify economic damages. It was suggested that it could be useful to prepare a state of the art paper to review attempts to quantify damages to natural resources.

There have been many recent advances in the literature dealing with the economic evaluation of the damages from marine pollution. However, it is recognized that often it simply is not possible to measure damages in dollar terms. In these cases, other social and scientific indicators of damages will have to be used.

Indicators of Damages

Social and scientific indicators can take many forms. The following listing, though not exhaustive, covers many of the indicators of damages resulting from a marine pollution incident:

1. Cleanup costs
2. Damages to property
3. Loss of use of property
4. Loss of profits or reduced earnings
5. Loss of tax revenue (less any cost savings)
6. Loss of cargo and vessel
7. Damages to health
8. Damages to, or loss of use of, natural resources
9. Environmental insult (or the psychological shock following an environmental disturbance)

Damages categories 1-6 usually will be measured in economic terms. It may be possible to place an economic value on 7 and 8, although in many cases damages to natural resources--as in the case where there is a kill of marine life that has no apparent viewing or commercial value--cannot be valued using an economic approach. It does not appear to be possible, at least with the current state of the art, to value the environmental insult, or psychological shock, felt by residents of an area following a pollution incident except to the extent this damage is reflected in area property values.

Focusing Government Research Efforts in Damage Assessment

A comprehensive damage assessment program will challenge the abilities of natural resource economists, scientists, and others. A particularly difficult area is the assessment of non-market-valued damages. There are a number of approaches that have been, or can be, used to evaluate in dollar terms damages to non-commercial marine resources, for example, wetlands, habitats, and non-marketed biota. The various approaches involve vastly different assumptions and data requirements and may, when applied in any given case, lead to widely different results. It would be valuable to commission a state of the art paper to summarize and critique the major applied work in this area. An objective of such a project would be to assess the potential biases, data requirements, and costs of alternative approaches and to suggest appropriate future directions for developing damage assessment methodologies to be applied to non-market-valued natural resources.

In a related vein, there are techniques available that permit, via survey techniques, an assessment of the subjective value of recreational experiences by individuals. However, there has not been a truly successful effort to apply and compare the alternative approaches in the context of a domestic marine pollution incident. One reason for this is the time element needed to plan such a study, design and test appropriate questionnaires, and so forth. In view of the fact that losses to recreationists can be one of the largest categories of damages from a large-scale marine pollution incident, it seems worthwhile to have a standby plan to fund a project to examine alternative approaches for estimating the non-market-valued damages suffered by recreationists.

The impact of marine pollution on property values appears to be another area where research is needed. People's attitudes toward pollution in an area will be reflected in what they are willing to pay for property. Therefore, it is possible to use changes in property values (holding all other factors affecting property value constant) to provide a measure of social attitudes and perceptions toware marine pollution.

A concern expressed in panel discussions was the fact that many damages may be long-term, while most studies are of a short-term nature. Damage assessment research thus may have a pronunced bias against including long-term effects unless some effort is made, where such research seems fruitful, to arrange for longer term projects or follow-up studies.

A distinction is made between research necessary to estimate damages from an incident and research that has as a main objective the development or testing of methodologies or furthering basic research. The polluter should be expected to pay for the former, but not for the latter, which is regarded more as "social overhead" and is a responsibility of society at large.

HAZARDOUS MATERIAL SPILL DAMAGE ASSESSMENT

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